DOCUMENT RESUME

ED 261 547 FL 015 215

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TITLE Cues for Understanding the Passive Voice.
INSTITUTION Stanford Univ., Calif. Dept. of Linguistics.
PUB DATE Aug 85
NOTE 10p.; Papers and Reports on Child Language Development, Volume 24, p123-30, Aug 1985. For related documents, see FL 202-214 and 216-17.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Adults; *Child Language; College Graduates; Comparative Analysis; *Comprehension; *Context Clues; *Grammar; *Language Acquisition; Preschool Children; Sentence Structure; *Verbs
IDENTIFIERS *Passive Voice

ABSTRACT

Two experiments were conducted on the use and combination of three cues that differentiate active from passive verbs: a form of the auxiliary "be," the morphology of the passive participle of the verb, and the case-making preposition "by." In the first experiment, 59 children aged 2.9 to 5.10 years were asked to interpret sentences with one, two, three, or no passive cues. Eight reversible action verbs were used, half of which have passive participles different from the simple past tense (homophonic) and half of which have passive participles identical to the simple past tense forms (unique). The children were asked to act out with toy animals the sentences given to them, first with intransitive practice sentences and then with the test sentences. Although it was expected that the unique passive participles would be better cues for passive than homophonic participles, no significant difference was found except in one five-way interaction of factors. The second experiment used college graduates and an almost identical procedure to determine whether the more mature children were interpreting the sentences as adults would. Results suggest that even when children interpret passive sentences correctly, they may not be processing them the way adults do. (MSE)

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# Cues for Understanding the Passive Voice

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By the time children are 3, they interpret reversible active sentences like the cow pushes the pig correctly 95% of the time, and they continue to do well as they get older (Bever, 1970). This is not the case with reversible passive sentences. Children of about 3 1/2 act out passive sentences at a level equal to or slightly above what would be expected by chance, while children who are a few months older do significantly worse than chance (Bever, 1970; de Villiers and de Villiers, 1973; Maratsos, 1974). The results of these experiments indicate that children initially treat passive sentences differently than active sentences, yet when they are a few months older they treat passive sentences like active sentences, interpreting the first Noun Phrase (NP) as the agent. At some later stage, of course, they interpret reversible passive sentences correctly. Bever suggested that both younger and older three year olds know which surface cues distinguish active and passive sentences but that the older children overuse the statistical generalization that Noun-Verb-Noun sequences correspond to Agent-Action-Patient interpretations. That is, children do not get worse as they get older because they forget what they once knew about passive sentences, but because they overuse an Agent-Action-Patient processing strategy.

Strictly speaking, children at no stage can respond to "the passive" directly: they must be sensitive or insensitive to the surface cues that differentiate actives from passives: a form of the auxiliary be; the morphology of the passive participle of the verb; and the case-marking preposition by. Little is known about which cues children at various stages of linguistic development use to distinguish passive from active sentences. Children might consider any sentence that contains one of these three cues passive, or they might require that two, or all three, cues be present. Furthermore, their strategies may be sensitive to some passive cues more than others. Maratsos and Abramovitch (1975) began to address these questions when they had children act out passive sentences which were missing either be or by. They found that children who are good at understanding passive sentences interpret strings like the cow pushed by the pig as passive, and sentences like the cow is pushed the pig as active. Children who perform at chance level on passive sentences interpret both types of strings as active.

In the experiments reported here we investigated the use of each of the passive cues and their combinations by asking preschool children and adults to interpret sentences which had either 0, 1, 2

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or all 3 passive cues.

## Experiment 1

Subjects. Fifty-nine middle-class and working-class children between 2;9 and 5;10 (mean of 4;3) were divided into 4 groups according to Mean Length of Utterance (MLU) in an elicited production task (these MLUs are not directly comparable to MLUs calculated from spontaneous speech). Children in MLU Groups 1 to 4 had mean MLU's of 3.1, 5.2, 6.9, and 8.8, and mean ages of 3;4, 4;2, 4;9, and 5;0, respectively. Nine additional children did not complete the experiment: three had names for less than half of the animals used in the experiment; three failed to get any practice trials correct; and three chose not to finish. One subject completed the experiment but was not included in the analysis because the tape recorder failed.

Stimuli. Table 1 shows the 8 possible sentence types defined by the orthogonal combination of presence or absence of the 3 passive cues. One type of sentence (actives) had no passive cues. Three types of sentence had only 1 passive cue (e.g., the cow is pushes the pig) and three more had 2 of the 3 passive cues (e.g., the cow is pushed the pig). Finally, one sentence type (passives) had all 3 cues.

Eight reversible action verbs were used in the experiment. Half of the verbs, the 'unique' verbs (beat, bite, shake and throw), have passive participles which are different from their simple past tense forms. The other four verbs, the 'homophonic' verbs (lick, push, tickle and touch), have passive participles which are identical to their simple past tense forms. Homophonic verbs cannot be used to study how likely a sentence is to be interpreted as passive when the participle verb form is the sole cue to the passive, because such a sentence is a grammatical active sentence (e.g., the cow pushed the pig). Unique verbs, in contrast, can be so used: the cow beaten the pig is not a grammatical active sentence. In addition, unique passive participles are more diagnostic of the passive voice than their homophonic counterparts, and hence might be more effective as cues for the passive.

Each subject was presented with 24 sentences: 3 examples of each of the 8 sentence types. Each verb was presented 3 times and no subject heard a particular verb in a particular sentence type more than once. Each subject heard at least one unique and one homophonic verb in each sentence type, and heard each animal appear equally often as the 1st and 2nd noun phrase. A Greco-Latin square was designed so that each sentence type occurred in each test position an equal number of times across subjects. Furthermore, each verb was paired with each sentence type an equal number of times across subjects.

Procedure. Children were tested individually in a quiet room. Prior to testing, subjects were asked to give names for 8 toy animals to be used in the act-out task, and the experimenter used the names provided. In the task, the two animals were placed in front of subjects prior to reading the test sentences, and the sentences were prefaced with the phrase "Make it so...".

Subjects were given 5 practice sentences to get used to the format of the experiment. These practice sentences consisted of intransitive sentences (e.g., the cow runs). The experimenter acted out one sentence and corrected any errors during the practice trials by demonstrating the correct action. During the actual experiment, children were praised after each test sentence, and their responses were recorded as "1st NP as agent", "2nd NP as agent", or "uncodable".

After they had completed half of the test sentences, subjects were asked to describe 6 pictures taken from a children's book for as long as they wanted. Descriptions were recorded and transcribed and MLUs were calculated from them.

Results. An Analysis of Variance was performed on the proportion of "1st NP as agent" responses, with presence of each of the 3 passive cues and homophony of the verb as crossed factors and subjects nested into 4 MLU levels. Significant main effects were found for By ($p < .0005$), Verb Morphology ($p < .0005$) and Auxiliary ($p < .05$), indicating that children were more likely to interpret a sentence as passive if these cues were present. There was also a significant 5-way interaction ($p < .05$) between MLU, By, Auxiliary, Verb Morphology, and Homophony of the passive participle. Figures 1 and 2 depict this interaction. Note that the y-axis of the two graphs represents the percentage of sentences interpreted as having the 1st NP as the agent and hence corresponds to percent correct for active sentences, percent incorrect for passive sentences, and the likelihood of interpreting the string as if it were active for the other 6 sentence types.

This discussion will focus on the results for verbs with unique passive participles (Figure 1) because their unique morphology makes them more informative and their data appear cleaner than the data for homophonic verbs. The effects of homophony will be discussed separately.

In Figure 1 the top four lines are for sentence types missing the preposition by. Except for some spread at MLU group 1, children seem to interpret any sentence that does not have the preposition by as active. In other words, children act as if they have the strategy "If the verb is followed by an NP with no intervening by, interpret that NP as the patient and the 1st NP as the agent". For the sentences with the preposition by, only the full passive is interpreted as passive and then only by the most linguistically mature children. These results are consistent with Maratsos and Abramovitch's (1975) finding that that strings with by are less likely to be interpreted as active than strings with be, but are inconsistent with their finding that children who understand full passives also interpret sentences like the cow pushed by the pig as passive.

Unique vs. Homophonic Verbs. Though unique passive participles should be better cues for the passive than homophonic participles, no significant main effect was found for participle homophony; nor did homophony interact significantly with presence of passive morphology. Homophony did, however, participate in the five-way interaction described above. We will not attempt to explain the

interaction as a whole, but will call attention to two noteworthy facts. First, and surprisingly, children were just as likely to decide that ungrammatical sentences with unique passive participles (e.g., the cow shaken the pig) were active as the corresponding homophonic sentences (e.g., the cow pushed the pig), even though the latter are grammatical active sentences. Second, the only condition in which we replicated the classic finding of children "getting worse" at comprehending the passive (between MLU 3.1 and 5.2) was with sentences whose participles were homophonic with the past tense forms of the verb. (In an ANOVA examining full passives only, MLU interacted significantly with Homophony ($p < .05$).) Thus our results raise the possibility that at the early stages, children's reluctance to act out passive sentences as if they were active might reflect some sensitivity to the correct alteration of semantic roles triggered by unambiguous passive participles. That is, if "getting worse at the passive" consists of a stage of initial random responding induced by unfamiliar morphemes, followed by a stage of adherence to a NVN processing strategy, then the fact that children did not "get worse" with unique participles may indicate that these participles were not simply unfamiliar morphemes, but were understood (in part) as passive markers.

## Experiment 2

In order to determine whether the more linguistically mature children in Experiment 1 interpreted the various strings like adults, we had a group of adult subjects interpret those strings.

Subjects. Twenty-five college graduates participated.

Procedure. The stimuli and procedure were identical to Experiment 1 except that instead of acting out sentences with toys, adults were given a response form and circled the name of the animal that they interpreted as performing the action. Subjects were told that not all the sentences had right answers, but that they should give their first impression about the meaning of each one.

Results. Significant main effects were found for By, Auxiliary, and Verb Morphology, and there was a significant 3-way interaction among these variables (all $p$'s $< .0005$). Results, which are shown in Table 2, can be summarized as follows: Adults interpret only grammatical active sentences as active. Otherwise they seem to act according to a "two out three rule": if a sentence has the preposition by plus either one of the other two passive cues, they interpret the sentence as passive. If a sentence is neither active nor fulfills the 2-out-of-3 rule, they interpret it at a chance level.

## Discussion

Even the most advanced children do not interpret incomplete passive strings as adults do. Figure 3 shows that for adults, each additional passive cue makes a sentence more likely to be interpreted as passive. Adults interpret sentences with two passive cues as passive almost as frequently as they interpret full passives as

passive. Even the most advanced children require that a sentence be a grammatically complete passive if they are to interpret it as passive.

Figure 4 shows a flowchart which summarizes the results of the two experiments. Linguistically less advanced children seem to have an active sentence schema or Agent-Action-Patient bias (see Slobin and Bever, 1982). If a sentence doesn't match that schema, it is treated as less active depending on the number of passive cues present. No sentence types are interpreted as passive. More advanced children seem to attend particularly to the preposition by. If a sentence does not have by, it is treated as active; if it does have by AND it is a full passive, it is interpreted as passive; otherwise it is acted out at chance levels. Adults interpret only grammatically correct active sentences as active. They seem to attend to the passive cues in the sentence, and if it has by plus either of the other 2 cues, it is treated as passive, otherwise it is interpreted at a chance level.

Why do adult and child data differ? Perhaps it is that children, but not adults, have a single 3-cue schema or template to match the whole passive sentence (cf. Slobin and Bever, 1982). Adults have decomposed the passive into 3 autonomous cues: verb morphology, the case-marking preposition by, and the auxiliary. As a result they do not need all 3 cues to perceive a sentence as a passive; each cue can be used in conjunction with others to guess whether a sentence is passive or active. Indeed, in modern linguistic theory, the full passive sentence structure is not generated by a single rule, but is as the conjunction of the outputs of several autonomous systems: Participle formation, yielding passive participles which can appear in a variety of surface structures (e.g., I had my cat neutered); tense, which prevents the passive participle from appearing as the main verb of a sentence; subcategorization, which allows be and get to have participle complements; and prepositional case-marking, which allows by to signal the agentive role in a variety of sentences (e.g., this painting is by John). Adults may be sensitive to this decomposition, and hence do not require a sentence to fit a holistic passive schema.

Why is the preposition by such a powerful passive cue for children and, to a lesser extent, adults? It is not because children frequently hear by used as the passive agentive case-marker. In an analysis of the corpora of Adam, Eve and Sarah (Brown, 1973; MacWhinney and Snow, in press) we found that adults used full passive sentences a total of 7 times in over 200 transcripts; the rest were truncated (e.g., the cow was pushed). Two other possibilities suggest themselves. Slobin (1973) and Gleitman and Wanner (1982) argue that stressed and syllabic morphemes are preferentially attended to. The preposition by is more syllabic than the passive participle suffix, and may be more stressed than the auxiliary be, hence children may attend to it more fully and acquire it more easily. Alternatively, by may be more diagnostic of passiveness than the other 2 cues. The auxiliary is really just a tense carrier, and the passive participle morphology, even when "unique", is not really unique, serving in past perfect sentences like the man has shaken the

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Table 1: 8 Sentence Types

| | |
|---|---|
| ACTIVE | The cow pushes the pig. |
| Verb + ed | The cow pushed the pig. |
| Is | The cow is pushes the pig. |
| Is Verb +ed | The cow is pushed the pig. |
| By | The cow pushes by the pig. |
| Verb +ed By | The cow pushed by the pig. |
| Is By | The cow is pushes by the pig. |
| PASSIVE | The cow is pushed by the pig. |

Figure 1
Children's Data: Unique Verbs

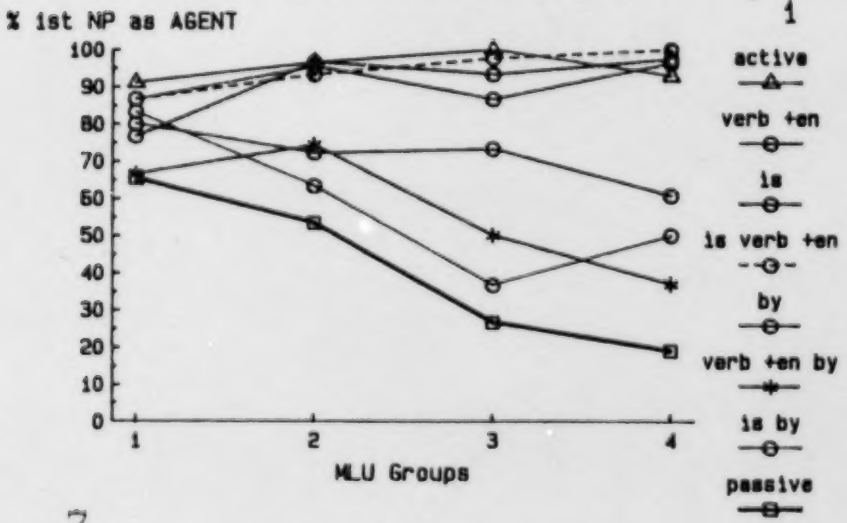



Figure 2
Children's Data: Homophonic Verbs

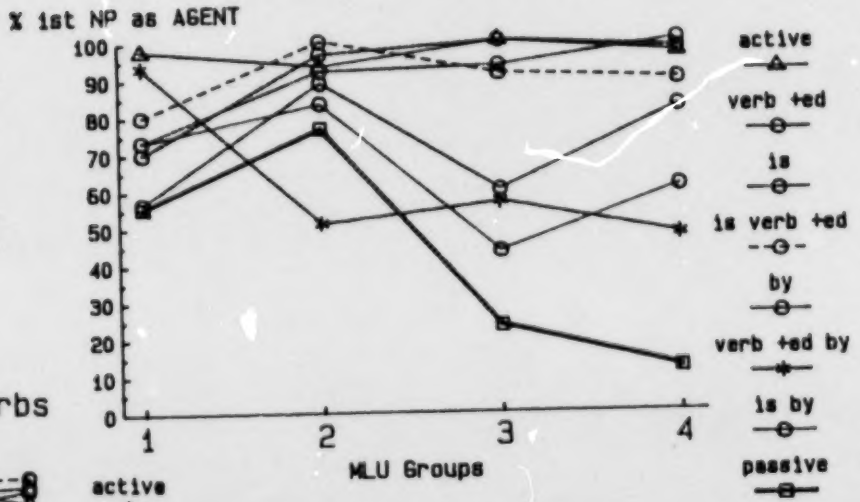



Table 2: Adult Data
(% 1st NP as Agent)

| | Homophonic | Unique |
|---|---|---|
| Active | 100 | 98 |
| Verb + ed/en | 100 | 74 |
| Is | 68 | 72 |
| Is Verb +ed/en | 44 | 30 |
| By | 38 | 48 |
| Verb +ed/en BY | 0 | 0 |
| Is By | 2 | 4 |
| Passive | 0 | 4 |

Figure 3
Number of Passive Cues

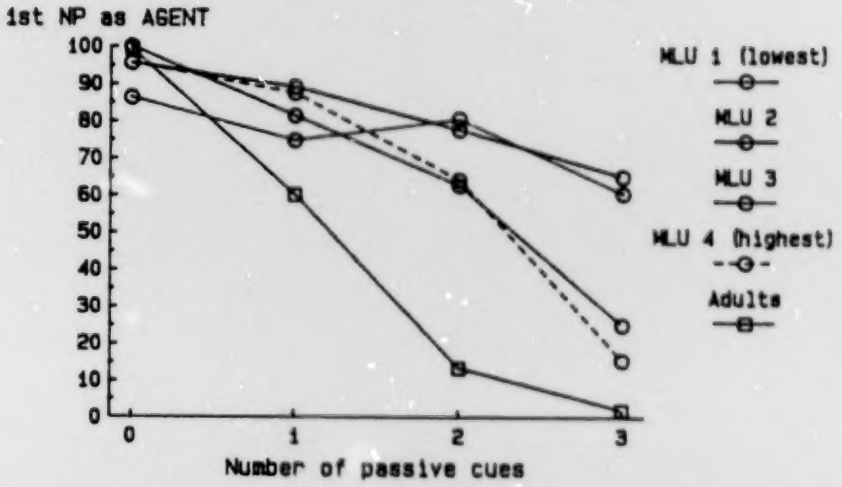
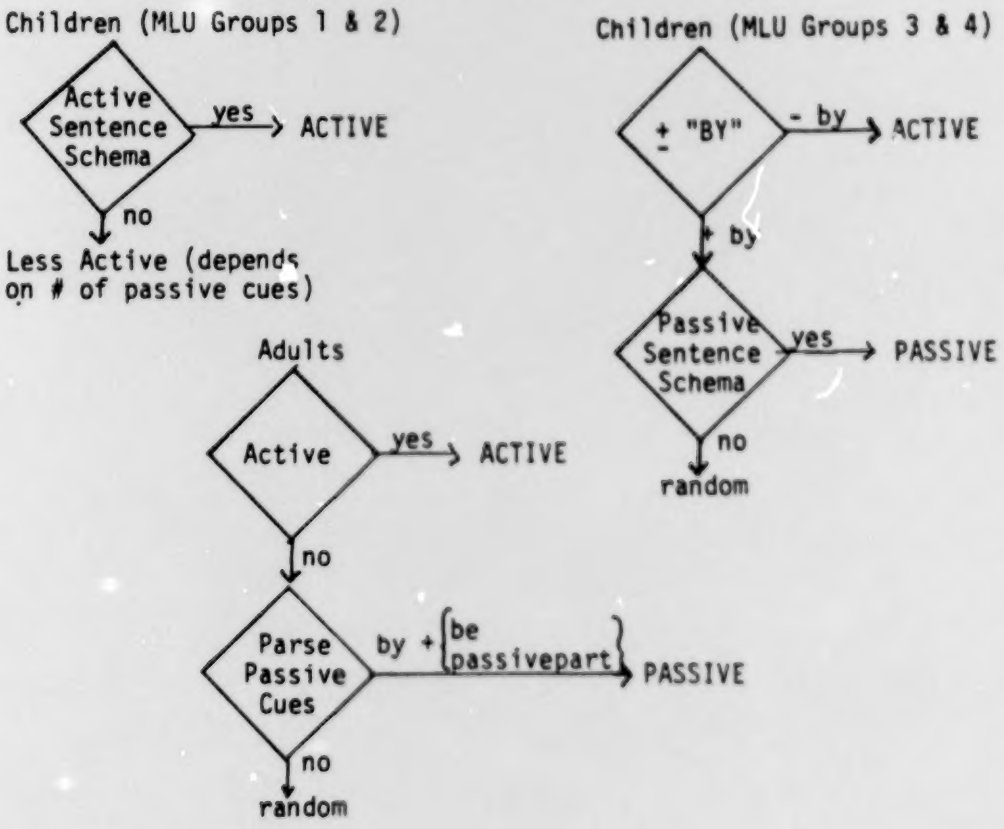



FIGURE 4: Decision Flowchart



rug.

But then just how diagnostic of passiveness IS the preposition by? Tabulations of adults' uses of the word by in the Brown transcripts revealed that only about 5% of adult uses of the word by were for passive constructions. Over 50% of the time by preceded a noun phrase that was instrumental or agent-like such as in the sentences I lifted it by the heel, he did it by mistake, this painting is by Pablo Picasso and I did it by myself. Likewise, although the preposition by was used only once in a passive sentence by any of the three children, in over 60% of their sentences with by, it preceded an agentive or instrument-like noun phrase. This suggests an intriguing possibility: Perhaps these agentive/instrumental/manner forms of by are cognitively or linguistically so similar to the passive by that when the child hears examples of agentive/instrumental by, he creates a lexical entry for by that assigns a general quasi-agentive, causative, or facilitative role to its NP object. This entry might be broad enough to include all nonspatial uses of by including the passive.

In summary, the results of these experiments suggest that even when children interpret passive sentences correctly, they may not be processing them the way adults do. Adults and children do share one thing in the way they process passive sentences: the preposition by is the most powerful passive cue for both groups.

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